# Rheumatoid Arthritis

## Diagnosis in Peripheral Joint Affliction

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*• The diagnosis of rheumatoid arthritis in a typical case depends upon a history of pain and swelling of various joints throughout the body. In the first stages the disease usually involves only the small joints of the hands and feet, but sooner or later it spreads to the larger joints. This may be accompanied by fibrosis of one or more joints, causing disability ranging from disuse of one joint up to total incapacity. Diagnosis in early or atypical cases is often impossible until the patient has been under observation a long time. It is important that diagnosis be made as early as possible, in order that appropriate therapy may be started and ankylosis and disability of the joints prevented.*

*• Since laboratory procedures and roentgen films do not show early changes, emphasis is placed on the history and physical examination for diagnosis.*

IN VARIOUS PUBLICATIONS in recent years emphasis has been placed upon arthritis as first among the chronic disabling diseases. Concomitantly there has been a steadily increasing interest in many quarters in various aspects of this illness. This concern is reflected in reports from industry, wherein invalidism from this condition has resulted in considerable absenteeism, by the formation in various communities of more and more chapters of the Arthritis and Rheumatism Foundation by altruistically minded citizens, by the development of arthritis clinics in an endeavor to aid the sufferers, by the formation of research units in many medical centers and above all by the introduction of new drugs. Rheumatoid arthritis, which comprises a large percentage of the rheumatic diseases, has been a challenge to investigators and has stimulated considerable research. All these developments constitute a forward-moving program which offers hope of relief to arthritic patients.

Rheumatoid arthritis is described as a generalized disease of unknown cause. The onset is variable, the illness is characterized by remissions and exacerbations, and it is impossible to predict what course the disease may take in individual patients.[1, 2] Diagnosis is often difficult in early cases. It is important that a physician have a definite plan of procedure and method of examination when confronted by patients who presumably have rheumatoid arthritis.

Some clinical grouping of patients with rheumatoid arthritis is necessary in order to determine their physical status and degree of disability. Patients may be separated into the following five categories:[3]

1. (a) Bedridden and disabled to a lesser or greater degree because of ankylosing processes in various joints. (b) Bedridden and joints mobile, but restricted in activity by acute inflammatory reaction in the joints and associated muscle spasm.

2. Ambulatory, but deformities present and accompanied by pain indicative of active and possibly progressive disease.

3. Ambulatory, with deformities present but with little or no pain; active process has subsided.

4. Ambulatory; swelling present in small *peripheral* joints; little or no disability.

5. Vague aches and pains in joints, but no accompanying disability or swelling.

Before therapy can be outlined for any given patient, it is important for the physician to classify the patient's illness by means of thorough examination. The basic procedures in our clinic are the following:

*The anamesis.* A detailed history is taken, with special attention to familial predisposition to the rheumatoid diseases, dietary abnormalities with emphasis on possible deficiency in vitamin C, exposure to extreme or sudden changes in temperature and humidity, recurring attacks of "low-grade infections" and repeated trauma to joint tissues. It is important to determine the mode of onset of the illness, the presence or absence of pain, swelling, redness, fever, and disability, and the progression of symptoms from one joint to another and the duration of these symptoms.

*Physical examination.* A thorough physical examination is made, and organic abnormalities are recorded, as well as the state of nutrition of the patient. Observation of the characteristic changes of the joints and the degree of disability of the joints

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is then begun. An inventory of the skeletal system begins with inspection of the hands. The presence or absence of subcutaneous nodules is recorded; obvious swelling of the interphalangeal, metacarpophalangeal and small joints of the wrists is noted; any apparent ulnar deviation of the fingers, subluxation of one joint upon another, flexor contractions and other possible deformities are catalogued. The patient is then asked "to make a fist" to determine whether or not he can completely close the fingers, then to volar-flex and dorsi-flex the hand upon the wrist. The degree of sensitivity of the inflamed tissues is then tested by grasping one of the patient's interphalangeal or metacarpophalangeal joints between the thumb and index finger and exerting slight to moderate pressure. This is a most important and delicate test to employ in the examination of patients with early rheumatoid arthritis, since the eliciting of pain may be considered a presumptive sign of an early inflammatory process.

The hands as well as the feet of patients with rheumatoid arthritis are cold and clammy. The increased sweat and tendency to Raynaud's phenomenon which often are manifest in this disease give evidence of deranged activity of the autonomic nervous system. The skin of the fingers may be smooth, glossy and atrophic. At times it is thickened so much that it closely simulates the skin in scleroderma.

The examination then proceeds to the elbow and, as with all the joints, a notation is made of evidence of atrophy of muscles, the degree of contractures or failure of complete extension and the degree of internal and external rotation. In examining the shoulders and hips, additional information is sought as to restriction of activity in the planes of adduction and abduction. It is to be emphasized that the temperomandibular joints may become involved, which handicaps the ability of the patients to chew. The sternoclavicular joint should be carefully examined and palpated for tenderness, for on occasion it may be the first or only joint afflicted. In a similar manner the knees, ankles and feet are scrutinized.

Although the subject matter of this paper is limited to a discussion of peripheral joints, it should be stressed that an examination of the skeletal system is not complete unless the entire spine is explored. To allow proper inspection and detection of points of tenderness and mechanical derangements of the vertebrae, the patient should disrobe completely and, unless incapacitated, should stand upon the floor. The patient should be supplied with a suitable drape which will not interfere with thorough examination of the spine. Early spondylitis of the lumbosacral spine may go undetected in a patient who, because of delicacy, has not removed her girdle or underclothing.

Subcutaneous nodules occur in about 15 to 20 per cent of patients. The size varies from 3 or 4 mm. to 1 cm. They are most often found in the regions of the elbows, especially over the ulna just distal to the olecranon process, but also appear frequently over the dorsal surfaces of the proximal phalangeal and metacarpophalangeal joints of the hands and less frequently on other bony prominences. While not painful, these nodules are unsightly and interfere with function of the joint.

Enlargement of the spleen occurs in about 5 per cent of patients. Generalized enlargement of the lymph nodes of moderate degree is commonly observed. Felty in 1924 reported on a series of patients who, in addition to rheumatoid arthritis, had leukopenia, splenomegaly and generalized lymphadenopathy. This group of clinical manifestations is usually referred to as Felty's syndrome.

*Laboratory tests.* The diagnosis of rheumatoid arthritis must be established from the findings in the history and from physical examination. There is no single laboratory test that in itself is diagnostic. However, certain tests provide helpful information. For instance, the rate of sedimentation of erythrocytes is usually rapid and may serve, within limitations, as an index of the acuteness of the process. Thus, the sedimentation rate is of value in following the course of the disease and measuring the effectiveness of treatment. Complete count of blood cells should be done, for frequently hypochromic microcytic anemia is found. The number of leukocytes is usually normal; a low content of leukocytes suggests the presence of Felty's syndrome. Blood serum agglutination of group A hemolytic streptococci is found in a considerable number of patients with rheumatoid arthritis. The ascorbic acid content of the plasma is low in 95 per cent of patients.

It is well to bear in mind that occasionally rheumatoid arthritis is associated with gout. Elevation of serum uric acid above 6.0 mg. per 100 cc. is consistent with a diagnosis of gouty arthritis.

*Roentgenologic observations.* The appearance of the structural changes in the roentgen films varies greatly according to the stage and duration of the arthritic process. Early in the course of illness no abnormalities are visible, but gradually characteristic changes take place. Intracapsular effusion and periarticular swelling are first to appear; later the bones adjacent to the involved joints show decalcification. There may be narrowing of joint spaces.

As the disease progresses, cartilage is destroyed and small areas of erosion appear in the cortex of the bone. These small regions of localized destruction, often referred to as "punched-out areas," are a prominent feature of rheumatoid arthritis, as well as of gout. In advanced cases the articular surfaces may become fused together through fibrosis of the pannus, with bony ankylosis developing ultimately. Frequently there are subluxations and overriding of

one joint upon another, with or without destruction of the cartilage of the joints. Some degree of bone production, lipping and osteophyte formation may be secondary to the arthritic process.

### CASE REPORTS

The many variations in the onset and course of rheumatoid arthritis can best be illustrated by the presentation of case histories. A case of pronounced severity will be described first.

CASE 1. A white male business executive, aged 42, was admitted to the University of California Hospital, October 15, 1934, complaining of pronounced disability of all peripheral joints. During his youth he had enjoyed good health, with the exception of minor illnesses. He had been athletically inclined and had achieved fame as a basketball player. Early in 1924 he became aware of pain and swelling in the left ankle which, however, did not incapacitate him. These symptoms subsided in a few days, but two weeks later the right ankle became swollen, painful and tender. Subsequently the right knee, the second and third metacarpophalangeal and proximal phalangeal joints of both hands, the wrists and the jaws were similarly affected. During the ensuing year all the peripheral joints became involved in the process until finally pain and disability confined the patient to bed. During the period he was bedridden, he stated that one joint after another became so rigid that he was unable to feed himself or care for personal hygiene. The constant attendance of a nurse or member of his family was required to care for his bodily needs. For several years before admission to the hospital he had been under the care of several physicians. Treatment had consisted largely in administration of pain-relieving medicaments and injection of vaccines. The patient had had no physical therapy.

Upon examination at the time of admittance it was noted that the patient was undernourished, incapacitated and pathetic in appearance. A survey of the skeletal system showed limitation of jaw motion and slight stiffness of the neck. There was swelling and tenderness of all metacarpophalangeal and proximal phalangeal joints accompanied by ulnar deviation of such degree that the patient was unable to grasp an object. The wrists were swollen. Stiffness of the elbows limited extension of the forearms to 160 degrees. The hips and knees were immobile; the ankles and the small joints of the feet were similarly involved. Both feet were turned outward about 30 degrees.

Results of laboratory tests were within the limits of normal, with the exception of a corrected erythrocyte sedimentation rate of 30 millimeters in one hour (Wintrobe). X-ray films showed atrophy of the bones adjacent to the involved joints, narrowing of the joint spaces and ankylosis of the hips and knees.

Treatment consisted of application of heat to the various joints and physical therapy directed at improving the tone of the many atrophied muscles. Both knees were operated upon in an attempt to free the fibrotic process and restore some degree of function. This procedure helped little. Two months after entering the hospital the patient, who had sufficient pecuniary means to care for his needs, was discharged to his home. With the aid of a nurse and a chauffeur he could be transported from one place to another in a specially constructed wheelchair that almost served as a bed and could be placed in an automobile from which half of the front seat had been removed.

The patient existed in this manner until 1950, when, at the age of 50, he died of lobar pneumonia.

This case illustrates many of the features characteristic of rheumatoid arthritis except that the disease progressed to an extreme degree of disability. At the onset symptoms were mild in degree; but they disappeared and recurred over a period of approximately one year. At the end of that time, persistent and permanent changes took place. This case also illustrates the dangers of a procedure which is used only too often and to the great disadvantage of the patient: Frequently patients with rheumatoid arthritis are confined to bed and given analgesics to relieve their pain without thought on the part of the physician of the degree of joint disability that may ensue. As the patient lies in bed, the joints gradually stiffen and eventually become ankylosed, as a result of the inherent proliferative character of the pathologic process. Finally, he is unable to use his hands, he cannot bend the elbows or knees, and proper function of the feet is lost because the weight of the blankets has caused them to be turned outward and fixed in that position.

The following case is typical of rheumatoid arthritis of moderate severity.

CASE 2. A 60-year-old housewife was admitted to the hospital January 15, 1950, complaining of pain in various joints of four months' duration. About six months previously she noted increasing fatigability and the need to lie down for a rest during the afternoon. Her appetite diminished and she began to lose weight. Approximately two months after the onset of symptoms she awakened earlier than usual one morning because of pain in the right first metacarpophalangeal joint. It was swollen and red. During the ensuing four months the disease gradually spread to many joints throughout the body. Although she had considerable pain, the patient remained ambulatory and continued doing her housework.

Upon admission the patient was observed to be undernourished and to have a wrinkled face that frequently expressed twinges of pain. Evidence of arteriosclerosis of moderate degree was seen in the vessels of the ocular fundi. Upon examination of the skeletal system, swelling and tenderness of the first,

second and third metacarpophalangeal and proximal phalangeal joints of both hands were noted. Both wrists were swollen and tender. The range of motion of the elbows, shoulders and hips was normal. Both knees were slightly swollen and painful, but normal range of motion was present. The ankles and the metatarsophalangeal joints of both big toes were slightly swollen and tender.

The erythrocyte content was 3,500,000 per cu. mm. of blood; the hemoglobin value 50 per cent (Sahli); the volume of packed red blood cells 31 per cent; and the corrected rate of sedimentation, 59 mm. in one hour (Wintrobe). The ascorbic acid content of the blood plasma was 0.3 per cent (normal 0.5 per cent).

Roentgen films showed pronounced demineralization of the bones of the hands and wrists. The joint spaces appeared narrow and poorly defined. There were small cystic destructive changes in the subarticular regions, most pronounced in the fourth and fifth proximal interphalangeal joints on the right side, and in both first metacarpophalangeal joints.

A transfusion of blood was given the patient on two occasions. Physical therapy, consisting of whirlpool baths to the hands and feet followed by massage and corrective exercises, became a daily program. Intramuscular injections of colloidal gold* in amounts of 50 mg. were administered at intervals of one week. An analgesive-sedative capsule containing 0.015 gm. phenobarbital, 0.2 gm. aspirin, 0.2 gm. phenacitin, and 0.03 gm. caffeine, was taken three times a day.

On this regimen of bed rest, adequate diet, exercise and medication, the patient improved. At the time of discharge on January 26, 1950, she had regained considerable use of her hands, although slight stiffness of the knees and ankles persisted.

The patient reported once a week for physical therapy and injections of gold. She remained ambulatory and was relatively free of pain until January 1951 when, within a period of one week, her son was sent to Korea to serve in the Armed Forces and her husband was confined to bed with coronary thrombosis. Both events caused considerable shock to the patient, and one month later she began to have increasing pain in the joints, especially in the ankles and the wrists. The sedimentation rate, which had fallen to 30 mm. in one hour, was now found to be 40 mm. (Wintrobe).

The symptoms persisted without much change until April, when coincident with bettering conditions at home, the general health of the patient began to improve. During the ensuing years she has continued her program of treatment, has been relatively free of symptoms and able to do her housework.

In this patient the symptoms and signs developed slowly during the early stage of the disease. Subsequently they became fulminant in character and widespread in distribution. The patient finally was confined to bed because of weakness, pain and undernutrition. With the aid of bed rest, transfusions for anemia, adequate diet, medication and appropriate physical therapy, the patient again became ambulatory in less than two weeks' time.

This case history illustrates the harmful effect of mental shock on patients with rheumatoid arthritis. After treatment was started the patient showed continuing improvement, but she had a relapse after the double shock of seeing her son sent to the Armed Forces in Korea and her husband critically ill with coronary thrombosis. After several months, incident to improvement in home conditions, the patient's disability lessened, and she then remained ambulatory.

In the early stage of rheumatoid arthritis the symptoms may be so protean that diagnosis is difficult. The illness may be diagnosed as psychoneurosis until the characteristic joint signs appear, as described in the following case.

CASE 3. A 36-year-old housewife reported for examination March 19, 1941, with complaint of easy fatigability and transitory vague aching pains in various joints. She stated that she had enjoyed doing her household duties and various community projects until seven months previously, when such activities became difficult and she found an increasing need for more rest. Because of a slight irregularity in menses, she consulted a gynecologist and was found to have retroversion of the uterus and a small fibroma. The patient was then referred for a general physical examination.

She appeared slightly underweight, the brow was furrowed and the facial expression was one of anxiety. Other than the anomaly of the pelvis no other abnormality was discovered on physical or neurological examination. Results of blood cell counts and urine examinations were within normal limits but the sedimentation rate was 27 mm. (Wintrobe) in one hour. A diagnosis of psychoneurosis was made, and the patient underwent psychotherapy for several months.

Between July 28, 1941, and February 28, 1945, she was seen by several specialists. Because of postnasal drip she voluntarily visited a rhinolaryngologist who gave her "some treatments in an endeavor to shrink down the mucous membrane." A few months later the patient consulted an allergist who, following skin testing, gave her injections of vaccine. There were periods when she tended to be depressed and easily upset emotionally, and for this her family encouraged her to visit a psychiatrist. Although she subsequently regained some composure and equanimity, she continued to have symptoms and, seeking relief, she asked a dentist to extract her teeth and replace them with dentures. On February 28, 1945, she was again seen in our clinic. She stated that a few days before, in addition to slight pain, she became aware of some stiffness in the left wrist and elbow. She complained of her symptoms to the local druggist who "counter-prescribed" cinchopen. On examination no obvious

*Myochrysine: Solution gold sodium thiomalate (Merck & Co., Inc.).

swelling or redness of the joints was apparent, but slight tenderness of the left wrist was elicited on pressure. Enteric-coated tablets of sodium salicylate, 0.6 gm. three times daily, were prescribed.

For the next three months the patient continued to have stiffness and some pain in the wrists and knees, particularly on arising in the morning, which was relieved by warmth, aspirin and exercise. No associated swelling was apparent until May 16, 1945, when there was definite swelling of the interphalangeal joint of the right index finger and thumb, slight thickening and tenderness of both wrists and limitation of motion in both shoulders. The sedimentation rate was 48 mm. in one hour. A diagnosis of rheumatoid arthritis was made.

The patient was then treated with intramuscular injections of colloidal gold at intervals of one week, whirlpool baths for the hands and wrists, and infrared and massage to both shoulders. By July 1, 1945, she was able to conduct her household duties with comparative ease.

The difficulty of making a diagnosis of rheumatoid arthritis in the early stage of its development is demonstrated by this case history. Patients may consult many physicians during this period because of the varied symptoms, and a diagnosis of psychoneurosis may be made. In the foregoing case symptoms related to the joints were of slight degree for at least four years before swelling and disability of the joints became evident.

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**REFERENCES**

1. Hench, P. S.: Chronic Arthritis, in Modern Medical Therapy in General Practice, D. P. Barr, Ed., Williams & Wilkins, Baltimore, 1940, 3:3298-3397.

2. Mettier, S. R.: Diseases of the Locomotor System, in Musser's Internal Medicine, Its Theory and Practice, M. G. Wohl, Ed., Lea & Febiger, Philadelphia, 1951. pp. 1327-1370.

3. Ragan, C.: The general management of rheumatoid arthritis, J.A.M.A., 141:124, 1949.